CN8803L

Low Power Low Dropout Linear Regulator with Current Limiting

1 Description

The CN8803L is a high accuracy low dropout linear regulator with wide voltage input range, which provides 150mA output current. It features short circuit protection, over current protection and thermal shutdown.

CN8803L is available in SOT23-3/5, SOT89-3, DFN2X2-6 packages to meet the high density PCB layout and thermal performance requirements.

2 Features

- Low quiescent current: 5μA
- Output voltage range: 2.5V~5.6V (step 0.1V), 12V
- High accuracy: ±2%
- Dropout voltage: 900mV @VOUT=3.3V / IOUT=150mA
- Maximum output current: 150mA
- Input voltage range: maximum 36V
- Output short circuit protection
- Thermal shutdown
- Overcurrent protection

3 Applications

- Smart meters
- Switching power supply

4 Ordering information

Product Number	Package	Quantity/Tape
CN8803LXXXOGR	SOT89-3	1000/Tape
CN8803LXXXAOGR	SOT89-3	1000/Tape
CN8803LXXXDSR	DFN2X2-6	4000/Tape
CN8803LXXXTCR	SOT23-5	3000/Tape
CN8803LXXXATCR	SOT23-5	3000/Tape
CN8803LXXXTGR	SOT23-3	3000/Tape

5 Marking

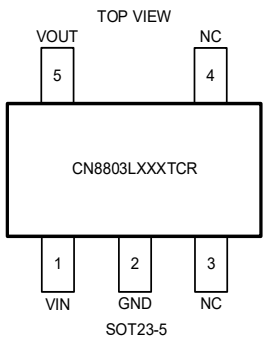
Product Number	Marking
CN8803LXXXOGR	03LXXX YYWW
CN8803LXXXAOGR	03LXXXA YYWW
CN8803LXXXDSR	03LXXX YYWW
CN8803LXXXTCR	03LXXX YYWW
CN8803LXXXATCR	03LXXXA YYWW
CN8803LXXXTGR	03LXXX YYWW

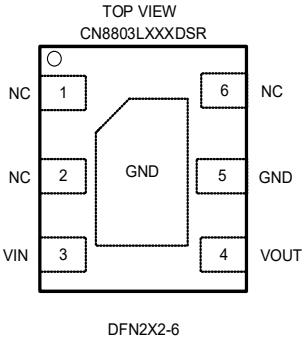
Note: XXX=Output voltage, YY/Y=Year, WW/W=Week.

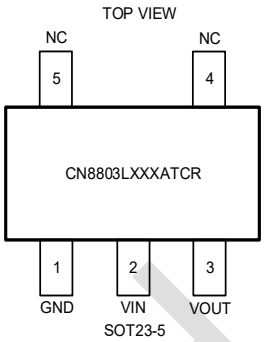
Green (RoHS & HF): CHIPNORTH defines "Green" to mean Pb-Free (RoHS compatible) and free of halogen substances. If you have additional comments or questions, please contact your CHIPNORTH representative directly.

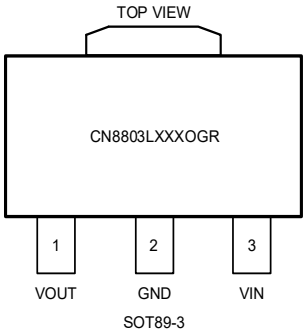
Moisture sensitivity level(MSL):3

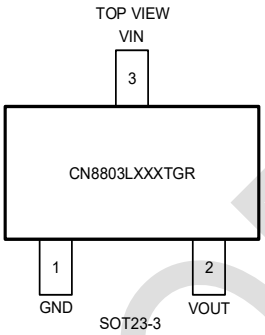
6 Pinout

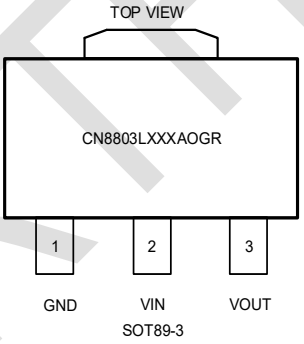




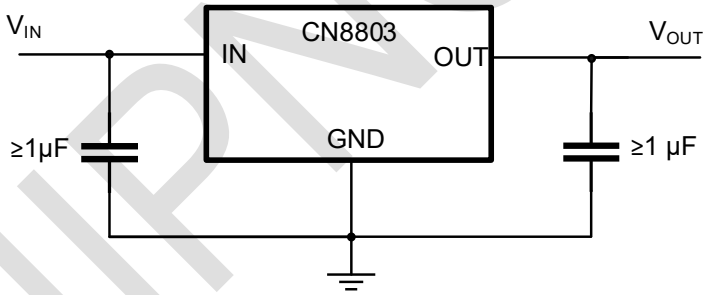






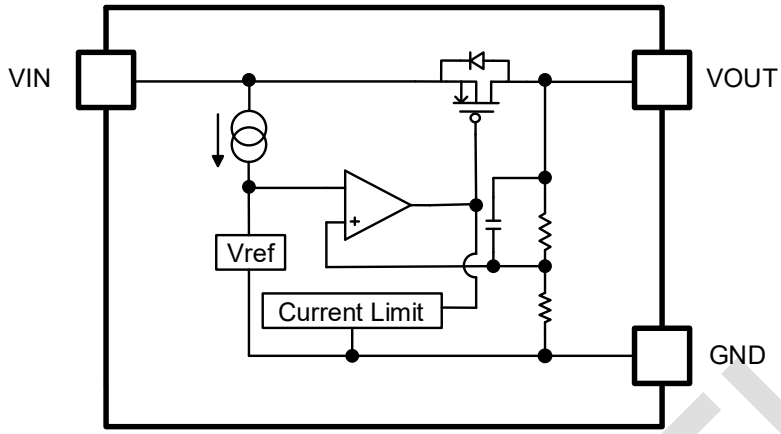


7 Typical Application



Note: General application circuits are recommended input capacitance C_{IN} ⩾ 1μF, near the chip input; output capacitance C_{OUT} ⩾ 1μF, near the chip output.

8 Block Diagram



9 Pin Descriptions

Pin No.							Descriptions
Pin Name	CN8803L XXXAOGR	CN8803L XXXOGR	CN8803L XXXDSR	CN8803L XXXTCR	CN8803L XXXATCR	CN8803L XXXTGR	
GND	1	2	5	2	1	1	Ground
VIN	2	3	3	1	2	3	Input
VOUT	3	1	4	5	3	2	Output
NC			1、2、6	3、4	4、5		No connect

10 Specifications

10.1 Absolute Maximum Ratings

Parameter	Symbol	Value	Units
Input Voltage	V_{IN}	-0.3 ~ 40	V
Output Voltage	V_{OUT}	-0.3 ~ 20	V
Storage Temperature Range	T_{STG}	-55 ~ 150	°C
Soldering Temperature	T_{LEAD}	260（Soldering 10s）	°C

10.2 ESD Ratings

Discharge mode	Standard	Value	Units
HBM	ANSI/ESDA/JEDEC JS-001-2024	±4000	V
CDM	ANSI/ESDA/JEDEC JS-002-2022	±2000	V

10.3 Recommended Operating Range

Parameter	Symbol	Min.	Max.	Units
Input Voltage	V_{IN}	V_{OUT}+1	36	V
Output Current	I_{OUT}		150	mA
Input Capacitor	C_{IN}	1		μF
Output Capacitor	C_{OUT}	1		μF
Operating Temperature	T_A	-40	105	°C
Atmosphere Pressure	p	63	106	kPa

10.4 Thermal Information

Parameter	Package	Value	Unit
Junction to ambient thermal resistance($R_{\theta JA}$)	SOT23-3	220	°C/W
	SOT23-5	188	°C/W
	DFN2x2-6	140	°C/W
	SOT89-3（OGR）	100	°C/W
	SOT89-3（AOGR）	165	°C/W

(1) Thermal resistance is not a fixed constant; its value is influenced by the following factors: PCB heat dissipation capacity, number and thickness of copper layers, ambient temperature, airflow velocity, etc.

(2) The thermal resistance values listed in the datasheet are provided solely for customers to compare the thermal performance of different packages. Since the heat dissipation conditions of the PCB in actual customer applications differ from those of our test boards, the actual measured thermal resistance values may vary from the nominal values in the datasheet. Customers should conduct verification on their own system boards to ensure that the thermal design meets the requirements of the product application.

10.5 Electrical Characteristics

Test conditions: V_{IN}=V_{OUT}+2V, C_{IN}=1μF, C_{OUT}=1μF, T_A=25°C, unless otherwise specified.

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Input voltage range	V_{IN}	I_{OUT}=10mA	V_{OUT}+1V		36	V
Output voltage *1	V_{OUT}	V_{IN}=V_{OUT}+2V, I_{OUT}=1mA	V_{OUT} x0.98	V_{OUT}	V_{OUT} x1.02	V
Line regulation	$\frac{\Delta V_{OUT}}{\Delta V_{IN} \cdot V_{OUT}}$	V_{IN}=V_{SET}+2V~36V I_{OUT}=1mA@V_{OUT}=3.3V		0.01	0.026	%/V
Load regulation	ΔV_{OUT}	V_{IN}=V_{OUT}+2V I_{OUT}=1~150mA@V_{OUT}=3.3V		15	28	mV
Quiescent current	I_Q	V_{IN}=7V, I_{OUT} =0mA		5	7.3	μA
Dropout voltage*2	V_{DROP}	I_{OUT}=150mA@V_{OUT}=3.3V		900	1250	mV
Max output current	I_{OUT_MAX}		150			mA
Current limit *3	I_{LIMIT}	V_{IN}=V_{OUT}+2V, SOT89-3		340		mA
		V_{IN}=V_{OUT}+2V, SOT23-5		310		mA
Short-circuit current	I_{SHORT}			200		mA
Output Voltage Temperature Coefficient	TC_{VOUT}	T_A=-40℃~105℃, I_{OUT}=1mA		30		ppm/℃
Thermal shutdown threshold	OTP			160		°C
Thermal shutdown threshold hysteresis	OTP_Hys			30		°C

Note*:

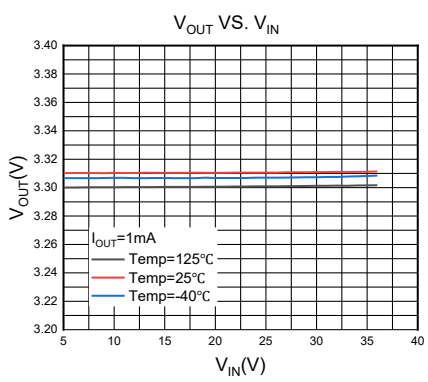
*1. $V_{OUT(S)}$: output voltage when V_{IN} = V_{OUT} + 2V, I_{OUT} = 1mA.

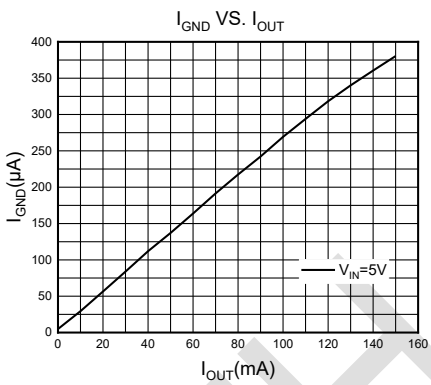
*2. V_{DROP}=V_{IN}-(V_{OUT_REG}*0.95), V_{OUT_REG} is the output voltage when V_{IN} = V_{OUT} + 2.0V and I_{OUT} = 150mA. V_{IN} is the input voltage, and when the input voltage is gradually reduced, the output voltage becomes 95% of V_{OUT_REG}.

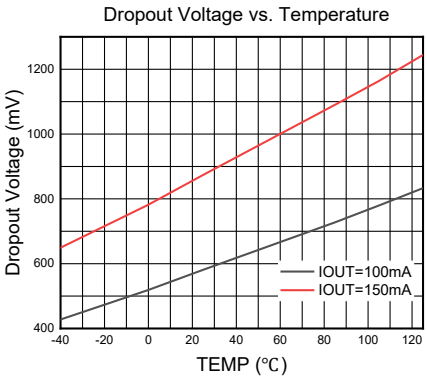
*3. I_{LIMIT}: Output current when V_{IN} = V_{OUT} + 2V and V_{OUT} = 0.95 x $V_{OUT(S)}$.

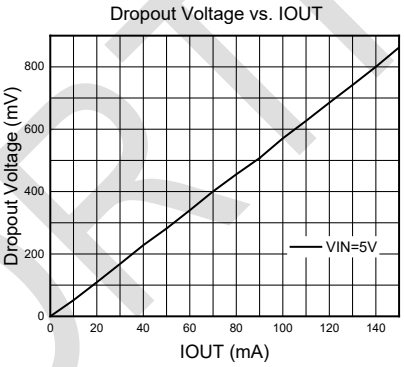
10.6 Characteristics Curve

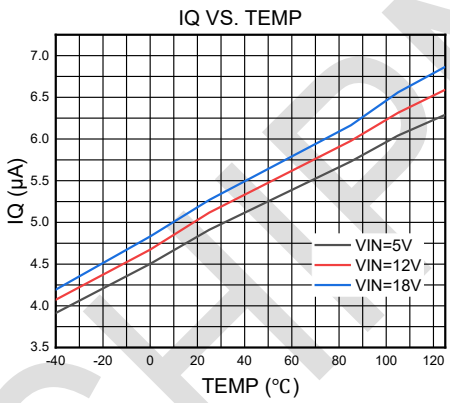
Test conditions: V_{IN}=V_{OUT}+1V, C_{IN}=1μF, C_{OUT}=1μF, T_A=25°C, unless otherwise specified.

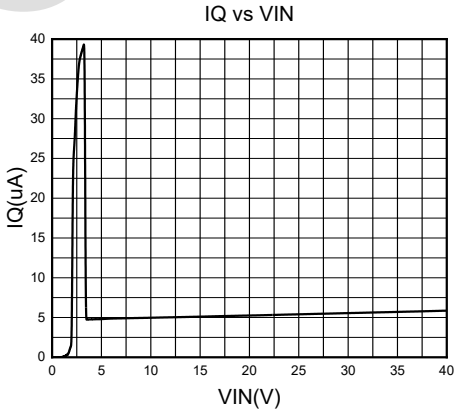


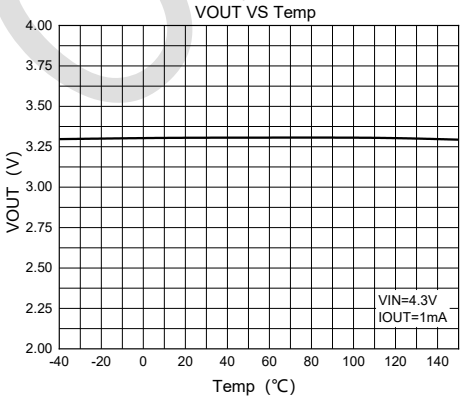


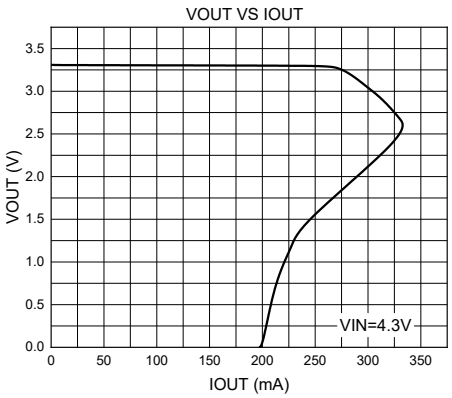












10.7 Operating waveforms

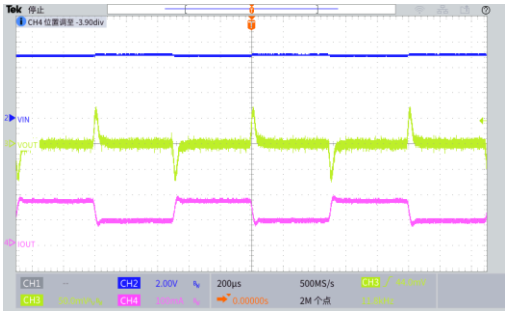


Figure1 Load Transient
(VIN=5V, IOUT=75mA-150mA-75mA)

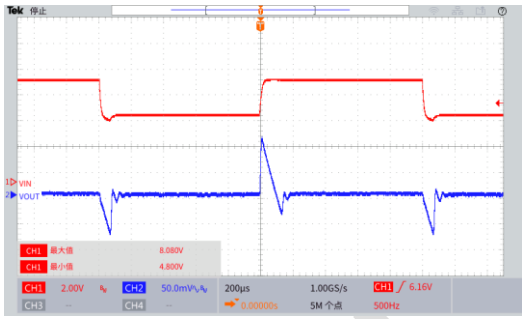


Figure 2 Line Transient
(VIN=from 8V to 5V to 8V IOUT=0mA)

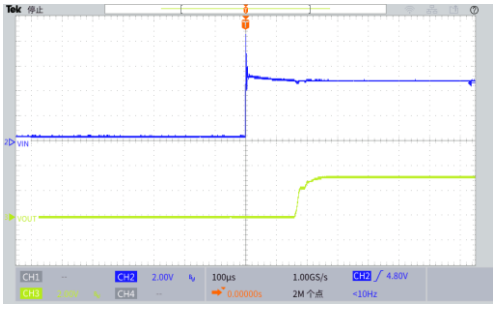


Figure 3 Power-up (fast)
(VIN=5V IOUT=0mA)

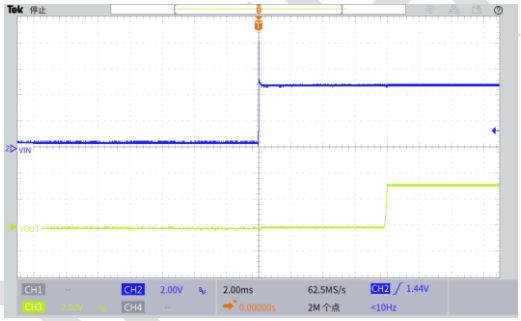


Figure 4 Power-up (fast)
(VIN=5V IOUT=150mA)

11 Application Information

CN8803L is a CMOS-based LDO linear regulator with a maximum input voltage of 36 V. It offers fixed outputs from 2.5 V to 5.6 V in 0.1 V steps plus a 12 V variant, delivers 150 mA output current, and has built-in short-circuit, overcurrent and thermal protection.

11.1 Over-current protection (current-limiting type)

The CN8803L integrates foldback current-limiting protection circuitry. When the output current exceeds the limit value, the output voltage drops, and the current limiter reduces the output current accordingly.

11.2 Short-circuit protection (current-limiting type)

When the output is shorted to ground, the current limit automatically decreases to a typical value of approximately 200 mA. This cuts power dissipation of the regulator and protects the power transistor. The output voltage recovers automatically after the fault is cleared.

11.3 Output voltage tracking mode

In normal regulation mode, the CN8803L requires the input voltage VIN to be at least 1 V higher than the set output voltage VOUT, so the internal error amplifier has sufficient headroom for stable constant-voltage output. When VIN falls below VOUT + 1 V, the regulator switches to an output voltage tracking mode. In this state, the internal power transistor turns fully on, the feedback loop saturates, and the output voltage is no longer regulated by the reference voltage, roughly matching the input voltage:

$$V_{OUT} \approx V_{IN} - I_{OUT} * R_{DSON}$$

Since the on-resistance R_{DSON} of the power transistor is very small, we can approximate $V_{OUT} \approx V_{IN}$.

This tracking feature supplies the maximum available voltage to the subsequent circuits under input undervoltage conditions, preventing sudden output collapse or power transistor overload caused by forced operation of the regulation loop. Meanwhile, the chip's internal short-circuit, over-current and thermal protection remain functional in this mode to safeguard the device under abnormal conditions.

When the input voltage rises back above V_{OUT} + 1 V, the error amplifier regains adequate supply headroom. The regulator smoothly exits tracking mode and automatically resumes precise regulation of the output voltage. It should be noted that in tracking mode, the power transistor operates in the linear region with zero loop gain, resulting in slightly worse output ripple and load regulation performance compared to normal regulation. This is an abnormal operating region and shall not be used for continuous operation.

11.4 Thermal protection

The CN8803L integrates an internal thermal shutdown circuit to limit total power consumption and avoid damage from excessive junction temperature. When the junction temperature exceeds the preset 160° C safety threshold, the protection activates to turn off the power transistor for cooling. The transistor reactivates after the temperature drops by roughly 30° C, which may cause pulsed output waveforms under continuous overload conditions.

11.5 Operating Range and Power Dissipation

The maximum power dissipation of CN8803L is determined by package thermal resistance, PCB copper area, ambient temperature and ventilation. Its internal power dissipation can be calculated via the formula below:

$$P_D = (V_{IN} - V_{OUT}) * I_{OUT} + V_{IN} * I_Q$$

where I_Q stands for quiescent current. The maximum allowable power dissipation is:

$$P_{D(MAX)} = \frac{T_{J(MAX)} - T_A}{\Theta_{JA}}$$

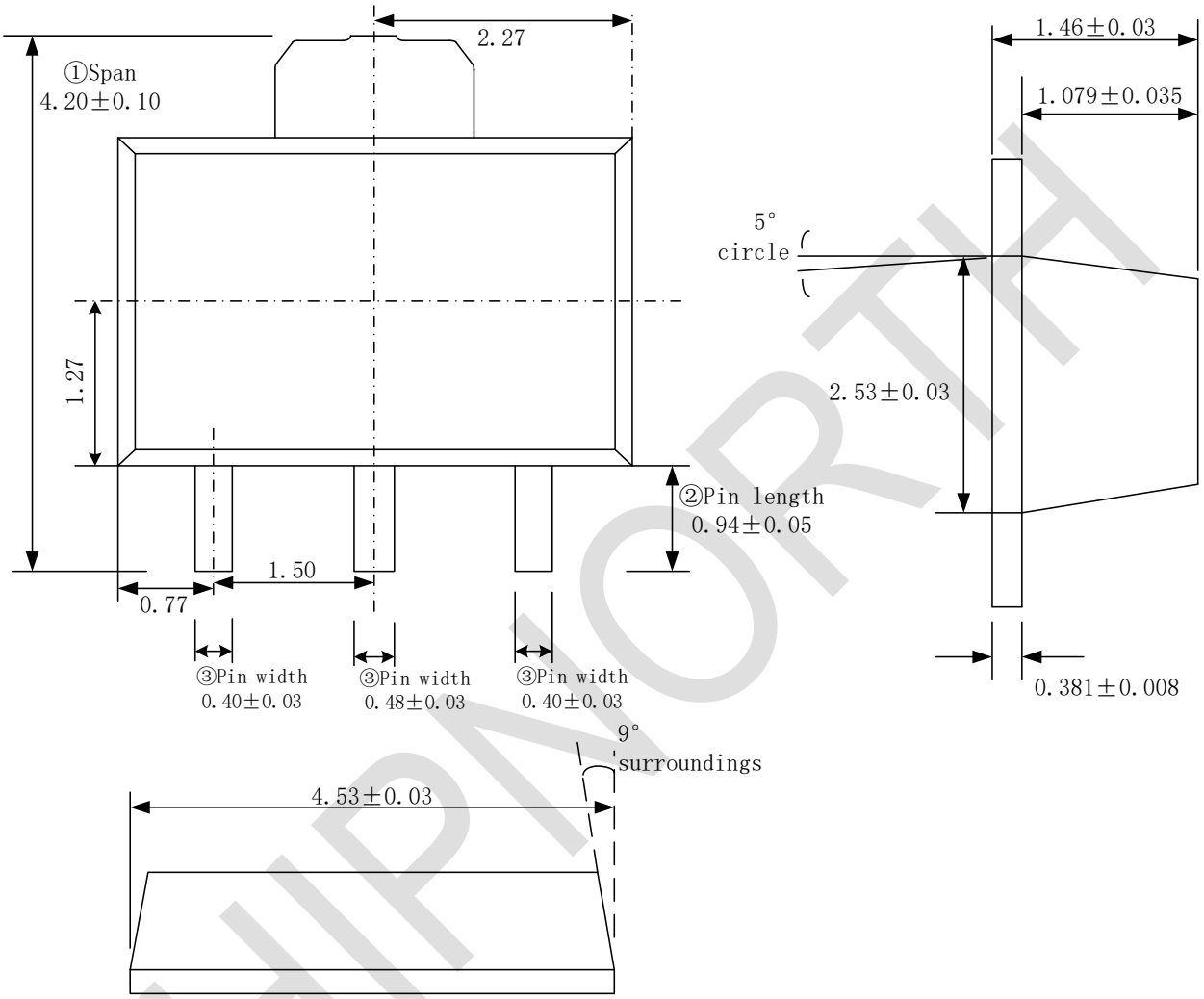
where $T_{J(MAX)}$ is maximum junction temperature, T_A ambient temperature, θ_{JA} junction-to-ambient thermal resistance.

As CN8803L supports up to 36 V input voltage, pay close attention to power dissipation for large voltage drop and high current applications to ensure$P_D \leqslant P_{D(MAX)}$.

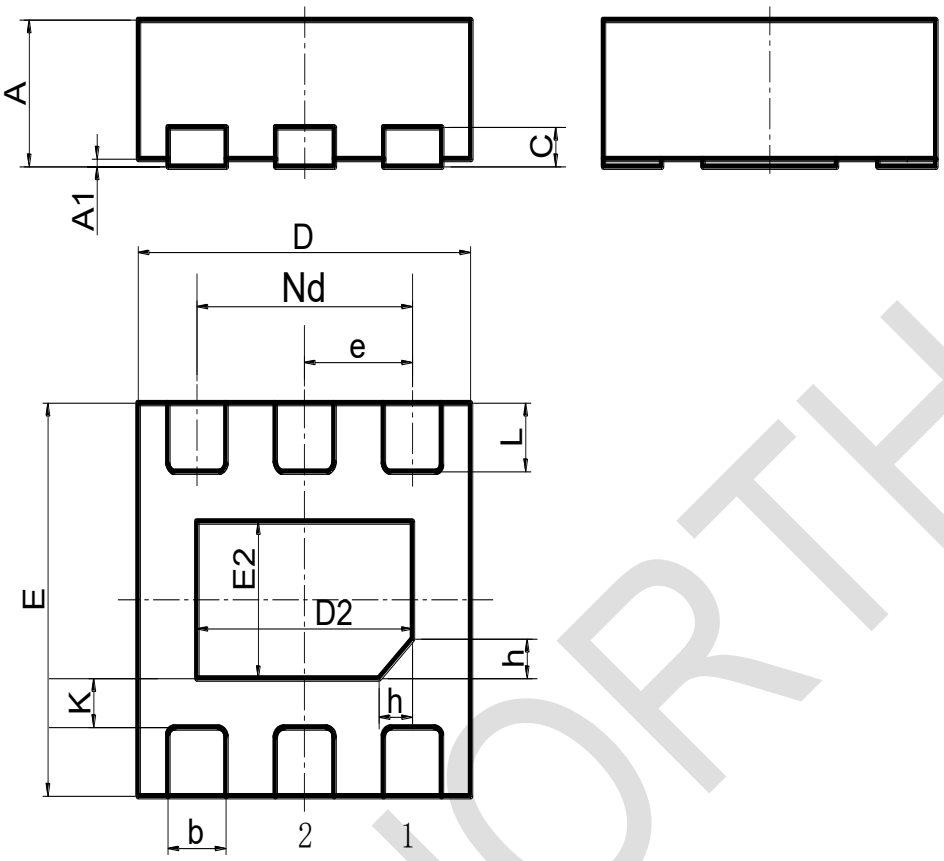
12 Package Information

SOT89-3

Unit：mm

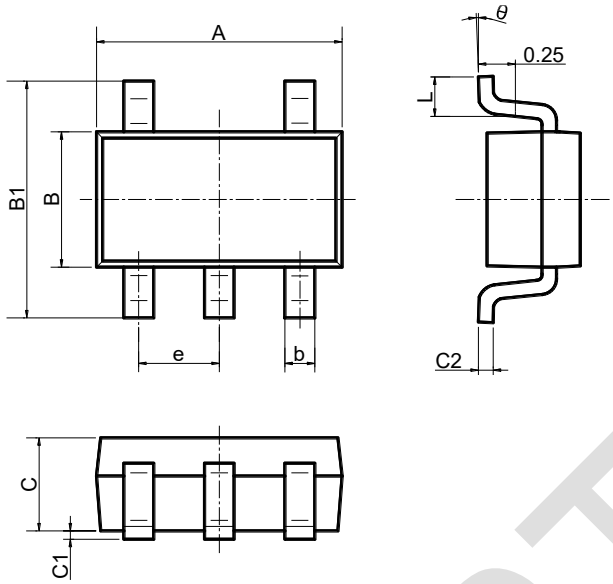


DFN2X2-6



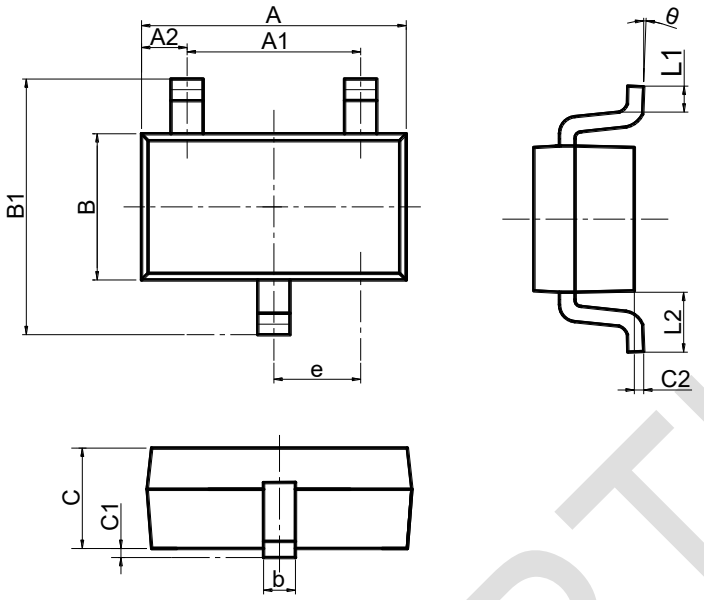
Dimension / Symbol	Min (mm)	Nom (mm)	Max (mm)	Dimension / Symbol	Min (mm)	Nom (mm)	Max (mm)
A	0.70	0.75	0.80	E2	0.75	0.80	0.85
A1	0.00	0.02	0.05	e	0.650BSC		
b	0.30	0.35	0.40	Nd	1.300BSC		
c	0.18	0.20	0.25	K	0.20	-	-
D	1.95	2.00	2.05	L	0.28	0.33	0.38
E	1.95	2.00	2.05	H	0.15	0.20	0.25
D2	1.25	1.30	1.35				

SOT23-5



Dimension / Symbol	Min (mm)	Nom (mm)	Dimension / Symbol	Min (mm)	Nom (mm)
A	2.82	3.02	C	1.05	1.15
e	0.95(BSC)		C1	0.03	0.15
b	0.28	0.45	C2	0.12	0.23
B	1.50	1.70	L	0.35	0.55
B1	2.75	3.05	θ	0°	8°

SOT23-3



Dimension / Symbol	Min (mm)	Nom (mm)	Max (mm)
A	2.70	2.90	3.10
A1	1.70	1.90	2.10
A2	-	-	0.6
e	0.85	0.95	1.05
b	0.30	0.40	0.50
B	1.50	1.60	1.80
B1	2.60	2.80	3.00
C	1.00	1.10	1.20
C1	-	-	0.10
C2	0.02	-	0.08
L1	0.20	-	0.55
L2	-	0.60	-
θ	0°	-	15°

13 Important Statement

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14 Revision History

Date	Version Number	Revision Notes
2026/07/06	R1.4	Update Application Information.
2026/08/21	R1.5	Update marking